Space Weather Forecast

Issued on Sunday, 19 February 2023 at 12:38 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Moderate flares likely with an ongoing Strong flare potential. Coronal Mass Ejection arrival possible day 1 or 2 (19th and 20th), with G1/Minor Geomagnetic Storms likely.

Analysis of Space Weather Activity over past 24 hours
Solar Activity: Low with only Common-class flares observed. The most notable sunspot region is in the northeast, which was still recovering from its Strong flare on the 17th. The group has shown some increase in magnetic complexity recently, which suggests this has the potential for further flaring. There are a total of seven sunspot regions on the visible solar disc, with a moderately sized group in the northwest remaining inactive, and a smaller group in the southwest exhibiting some minor growth. The other regions are generally mature and stable. A very slow Coronal Mass Ejection (CME) seen in the southwest is currently being assessed for an Earth directed component, but it currently seems unlikely.

Solar Wind / Geomagnetic Activity: Solar winds showed a decline to slow levels, as the recent coronal hole fast wind eased. Wind speeds declined from slightly elevated levels around 440 km/s to slow levels near 360 km/s. The total Interplanetary Magnetic Field strength was Weak, with the north-south component also varying weakly. Geomagnetic activity was Quiet to Unsettled (Kp 0-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) was at background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary
Solar Activity: Low to Moderate activity expected, with isolated Moderate-class flares likely, but also a chance of rising again to High with further Strong flares. The main risk for further significant flaring is the sunspot in the northeast that produced the Strong flare on the 17th.

Solar Wind / Geomagnetic Activity: CMEs from the 15th and 16th have now likely missed Earth. A further fast CME associated with the Strong flare on the 17th has been assessed to have an Earth-directed component, although most of the material of the CME will miss. This is anticipated to arrive on day 2 (20th), however there is sufficient uncertainty that an earlier arrival on day 1 (19th) cannot be ruled out. The impact of any arrival is low confidence. Further coronal hole fast wind influence is possible on days 3 or 4 (21st and 22nd). Generally Quiet activity is expected with Unsettled intervals. However, the CME arrival will likely bring a period of Active to G1/Minor Storm, perhaps reaching G2/Moderate storm. Unsettled to Active conditions also likely later day 3 or day 4 from any fast wind arrival.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is most likely to remain at background levels, but with a slight chance of rising and exceeding the S1/Minor Storm level in response to any larger flares.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	30	60	20	10
Strong	G3	No	5	5	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	60	50	40	40
Very Active	R3 to R5 X	No	25	20	15	15

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	10	5	5
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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